or up-grade process of evolution from elements of low atomic weight to elements of higher atomic weight occurs anywhere in the cosmos. If evolution is universally true in principle some process of this order must have occurred in the past and may be occurring now. Laboratory results which are indicative of "transmutation" in the sense of degradation are becoming more and more incorporated with modern chemical doctrine, but experimental evidence of the opposite process can scarcely be considered at present conclusive. The notion of utilising the energy of degradation of radium emanation for transmutational purposes was presumably based on the expectation of degradation rather than of aggregation.

The question of the evolution of the chemical elements is an old one, and the suggestion of evolution offered by the periodic law has been taken up by many writers whose speculations are no doubt familiar to chemists. The author of the present work does not discuss any of these speculative attempts to trace the lines of descent, although he gives some very useful tables summarising existing knowledge with respect to the disintegration products of the radio-active elements. But in directing attention once again to the evidence of evolution furnished by the study of stellar spectra by that comparative method which will always be recognised as the work of Lockyer and his school, Prof. Letts does good service by reminding chemists that the newer developments of their science have enhanced the importance of astrophysical (why not astrochemical?) work to an extent quite undreamt of at the time when the spectroscope was first brought to bear upon these problems.

If any justification for undertaking the part of a critic is required on the present occasion it may be permissible to express regret that the author should have devoted so much space to reprinting long extracts from the original writings of the authorities quoted. All the books and papers referred to are easily accessible, and Dr. Letts gives evidence of being such a very clear thinker when he deals with his subject in his own way that we should much have preferred to read his own version and criticisms. This particularly applies to the last chapter, which is devoted to an account of the views of Arrhenius in his now well-known book on "Worlds in the Making" published in 1908. The direct bearing of the views set forth in that work on the fundamental problems of modern chemistry are not very obvious, and we should have been glad if Dr. Letts could have given less space to the extracts from the said book and more space to the discussion of the special reasons for including the subject in his own volume. The main contribution to purely "astrochemical" thought which must be credited to Arrhenius would appear to be the recognition of heat as an associative as well as a dissociative agency. In theories of cosmical evolution, this point may have been insufficiently realised, although the possibility of endothermic combination between certain elements under high pressure in the sun and stars cannot be generalised into a universal process for all kinds of matter without further evidence.

Enough has been said, however, to warrant the statement that the author has produced a most useful and suggestive little volume which may be profitably read by chemists of both the older and younger generations. R. MELDOLA.

GEOLOGY AND GEOGRAPHY.

(1) *La Face de la Terre.* (Das Antlitz der Erde.) By Prof. Ed. Suess. Traduit de l'Allemand avec l'Autorisation de l'Auteur et Annoté sous la Direction de Emm. de Margerie. Tome 3. (3 Partie.) Pp. xi+957—1360. (Paris: Armand Colin, 1913.) Price 12 francs.

(2) *Traité de Géographie Physique. Climat—Hydrographie—Relief du Sol—Biogéographie.* By Prof. Emm. de Martonne. Deuxième Edition. Pp. xii+922. (Paris: Armand Colin, 1913.) Price 22 francs.

THE two volumes before us strikingly illustrate the principle that scientific geography—as distinct from mere geographical description—must be based on the deductions of geology and the physical sciences; and no less do they indicate how much geology looks to gain from the study of the present features of the earth's surface, and of terrestrial processes now going on upon it.

(1) That M. Margerie's French edition of the great work of the distinguished Austrian geologist is not a mere translation has been already pointed out in the pages of NATURE. The judicious notes, bringing the text up-to-date, with the exhaustive references to recent literature and the numerous additional illustrations, make the book an absolute necessity in every scientific library. In this third part of vol. iii., M. Margerie has reached the penultimate section of his great task, and an additional coloured plate, with eighty new illustrations in the text, give a measure of the important additions which have been made to the original work.

(2) Nor are the additions which have become necessary to the comprehensive volume of Prof. de Martonne less abundant and important. Since the first edition appeared four years ago, the author reminds us that geographical research has added largely to our knowledge—not the least striking

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additions being the visits paid for the first time to both the poles within that period! No fewer than 216 pages, with four plates and fifty figures in the text, have been added to the book to bring it thoroughly up-to-date. The present edition maintains the character of the original one, as an invaluable work of reference upon the subjects of which it treats. J. W. J.

WORKS ON ECONOMICS.

(1) *The Influence of the Gold Supply on Prices and Profits.* By Sir David Barbour. Pp. xii+104. (London: Macmillan and Co., Ltd., 1913). Price 3*s.* 6*d.* net.

(2) *Social Insurance. With Special Reference to American Conditions.* By I. M. Rubinow. Pp. vii+525. (New York: Henry Holt and Co., 1913.) Price 3.00 dollars net.

(1) SIR DAVID BARBOUR'S long experience in connection with the finances of India gives great weight to his conclusions on questions of currency and of the standard of value, in which he holds a position of authority. In the present work he undertakes to show in what way the quantity of money affects prices, and what are the limitations to the theory that its influence upon them is substantial. This is a question of real importance, because variations in price exercise a "profound and subtle influence" on human affairs. "A general fall in prices sets up stresses in the social fabric which search out the weak points in the structure. A general rise in prices smooths away many difficulties, but may create others." The author puts his theory in the form that "other things being equal, the level of prices is proportionate to the quantity of money." The question arises, What are the "other things" that are required to be equal, in order that this generalisation may be supported? It is important to consider the modern system of credit, as affecting the amount and efficiency of the work money has to do. Sir D. Barbour rightly deprecates the dangerous practice, which apears to be growing, of attempting to remedy by legislation the evils that are due to a rise or fall in prices.

(2) Mr. Rubinow's work is an elaborate study of a subject which has of late years acquired great importance in England and other European countries, and an urgent plea for general adoption of a policy of social insurance in the United States of America. The expression "social insurance" is, indeed, one of comparatively recent introduction, and is used as distinctive from commercial insurance, though there is no real difference of principle between them. The difference in practice arises when voluntary insurance develops into subsidised insurance, and that again into compulsory insurance. Under these heads the author describes what has been done in Europe towards insurance against industrial accidents, against sickness, against old age, invalidity and death, and against unemployment; and necessarily devotes much attention to the history of the movement in those directions in Germany and in England. In neither country does he consider that all the branches of social insurance have been adequately developed. All leave unrelieved many exceptional cases. The relief is, in general, insufficient. The question of cost becomes a material one if this is to be remedied. Here, we think, Mr. Rubinow takes too optimistic a view. He estimates the burden of the British insurance system as between 85 and 100 million dollars, and compares it with the 160 million dollars that the United States have been (we fear, improvidently) spending for war pensions. Estimating that the wealth of that country increases annually by 5000 million dollars, after all truly wasteful expenditures, both private and public, have been allowed for, he thinks it unnecessary to discuss whether it can afford the expense of a social insurance system.

Both these works are valuable contributions to the study of economics.

OUR BOOKSHELF.

The Riddle of Mars the Planet. By C. E. Housden. Pp. xi+69+plates. (London: Longmans, Green and Co., 1914.) Price 3*s.* 6*d.* net.

THERE are many who have read with real pleasure Dr. Percival Lowell's pleasant diversions based upon his assiduous and careful observations of the planet Mars, which the magnificent equipment of his well-placed observatory have made possible. Whether they have followed him to all his conclusions is immaterial, they have admired his skill and industry, his beautiful photographs, his imagination and the charming way in which he has presented his case. Among his followers the author of the present work is one who is not content with merely following Dr. Lowell, but, being apparently of a constructive turn of mind, he has gone in considerable detail into the engineering works that are obviously required to help the water of the melting snow caps to the parts of the planet where it is wanted for the growing crops. By the use of a coloured plate or diagram on which the colour changes in different latitudes in the course of the Martian year are represented, the author develops the engineering problem of moving the water, using open canals or closed pipes where water is pumped over or to high ground. He wants for this purpose 2,500,000,000 N.H.P.; 170,000 6-ft. pipes, each 1400 miles long, with ten pumping stations of 1150 N.H.P. to each to account for part of the total power required. Oil engines are suggested, the oil being obtained from wells as on earth, but possibly sun power in the clear sky is used

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